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MONTANA INSECT PESTS

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Thirty-Fifth Report
of the
State Entomologist



MONTANA STATE COLLEGE
AGRICULTURAL EXPERIMENT STATION
BOZEMAN, MONTANA

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To His Excellency
Governor J. Hugo Aronson
State House
Helena, Montana

My Dear Governor Aronson:

I am submitting herewith the Thirty-fifth Report of the State Entomologist of Montana. This report contains information regarding the status of the more important insects and control programs. A report on the goatweed beetle program is included.

During the biennium 1,527 inquiries were answered concerning insect identification, control, and general information; 79 meetings were attended and 3,270 persons were contacted in this manner. In addition, 79 publications, articles, and radio scripts were prepared and released.

It is apparent from the above figures that Montana residents are becoming more aware of and more interested in their insect problems. This office has managed to meet these increased demands so far. It is anticipated that the activities of this office will not be expanded appreciably during the coming biennium.

Respectfully submitted,

James H. Pepper
State Entomologist



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MONTANA INSECT PESTS 1953 and 1954

Thirty-fifth Report of the State Entomologist

J. H. Pepper

G. R. Roemhild

L. N. Graham¹

INTRODUCTION

The general trend in insect numbers observed in 1951 and 1952 has been reversed during the last biennium. At the present time it appears that most of our insect pests are increasing. Although no new insect enemies have been introduced into the state, it would appear that those already here are increasing both in number and in their range of distribution. These increased insect problems are probably due to weather conditions and to the intensification, diversification, and general expansion of agricultural programs within the state. In spite of the increased occurrence of insect pests, economic losses have been minimized by improved and more efficient methods of combatting them.

Range and cropland grasshoppers, which were almost at a historical low in 1951 and 1952, are again increasing in numbers to the point where they are causing some damage in many regions over the state. Their ravages are felt most in those areas of range land where dry weather and excessive grazing by livestock have already depleted the range. The range grasshopper investigations currently being carried on by this office in cooperation with the Agricultural Experiment Station of Montana State College show that the misuse of range is one of the contributing factors to range grasshopper population increases.

¹State Entomologist; Assistant State Entomologist; Assistant State Apiarist

In the areas of the state where research is being conducted, the evidence points out that range lands which have been very heavily utilized are the first to show the effects of drought by a shift in vegetation from perennial range grasses to broad-leaved forbs and annual grasses which are conducive to a buildup of some grasshopper species. If we are entering a period of dry years, all of the available evidence indicates that we can expect rather rapid buildups of range hoppers in those areas where the range is now in a semidepleted condition.

The problem of grain contamination both at terminal elevators and in farm storage has become very serious. Therefore, this office, in co-operation with the Agricultural Experiment Station, has conducted an investigation during the last year which quantitatively illustrates the seriousness of such contamination. In all, about 40 elevators in the triangle area have been inspected for contamination. Wherever possible samples were taken from four areas in each elevator: the boot or pit, main floor deck, top surface of the bins, and deck of the cupola. In 36 of the 39 samples taken from the boot, evidence of mouse contamination was present. In a good many cases, mouse contamination is not always evidenced in the form of droppings but is shown by the presence of mouse hairs. Mouse hairs, per 8-ounce sample, varied from none to as many as 224; and mouse droppings from none to 560 per 8-ounce sample. In all of the samples the only evidence of insect contamination was found in the boot. In three elevators granary weevils were or had been present, and moth cocoons were found in five others. Dermestids were found in four cases. Samples from the deck of the cupola were very heavily contaminated with mouse hairs. Only two of the samples were uncontaminated by mouse hairs or other foreign material. In addition to mouse contamination, bird droppings were encountered in 11 of the deck samples. As many as 836 whole bird droppings were counted in one 8-ounce sample. Ten out of 36 samples from the top of the bins showed evidence of mouse contamination. Many of the top samples had no other foreign particles in them than grasshopper fragments, which are virtually unavoidable. In all but four samples taken from the main floor surface, mouse hairs or droppings or both were present. Bird droppings and feathers were likewise frequently encountered.

In addition to the work done in commercial elevators, 49 farm storage facilities in the triangle area were also sampled. These samples were taken from the surface area of the bin. Thirty-one samples out of the 49 showed varying degrees of mouse contamination from as low as a single hair to as many as 277 mouse droppings per pound. Fifteen of the 49 samples showed evidence of bird contamination. The type of storage, i.e., whether wooden or steel, appears to be of little consequence since poorly maintained steel storage is often as highly contaminated as wooden bins. The data indicate and observations corroborate the fact that very little progress has been made in inspiring the storer to take better care of his grain. In view of this situation, an attempt will be made to assimilate all the pertinent

data relating to this problem in a booklet which can be used by vocational agriculture teachers throughout the state. The responsibility for this project will rest mainly on this office, but the Northwest Crop Improvement Association will tender any aid possible.

The Federal Food and Drug Administration is aware that much of this contamination in grain is avoidable. At the present time it is conducting a program to eliminate, in so far as possible, the contamination of cereals to be used for human consumption. Consequently, a good deal of this grain may, in the future, be condemned and declared unfit for food if this situation continues to exist. Another form of contamination has been brought to our attention by the Federal Food and Drug Administration. This has been the practice of dumping into farm storage bins fungicide-treated grains which were not seeded. In the Northwest, during the summer of 1954, approximately 60 carloads of this fungicide-treated grain, worth almost \$250,000, were condemned by the federal food inspection authorities. In addition, it was known that at least 10 carloads of insecticide-contaminated wheat were put on the market. In the latter case, the federal authorities could do nothing since this wheat was not shipped through interstate commerce.

GENERAL FEEDERS

GRASSHOPPERS

1953 Season

Grasshopper populations on cropland in 1953 were generally higher than in 1952. A few localized, very severe infestations along with some light to moderate crop damage occurred in Yellowstone, Golden Valley, Chouteau, Hill, Sweet Grass, Beaverhead, Liberty, Cascade, Pondera, Park, Stillwater, Big Horn, and Phillips counties. The greatest damage was to grain crops, although there was some damage to alfalfa. Moderate range land grasshopper infestations, which caused damage to grazing lands, occurred in Pondera, Yellowstone, Big Horn, Beaverhead, and Jefferson counties.

1954 Season

Grasshoppers on cropland in Montana showed a marked increase in 1954. This was especially true in the area of Toole, Liberty, Hill, Chouteau, Pondera, Teton, Cascade, and Fergus counties. In addition, many of the other counties in the mountain area of the western part of the state showed light to moderate damage. Probably the most damaging cropland grasshopper was *Melanoplus bivittatus*, although marked increases were noted in populations of *Aulocara ellioti* which did severe damage in some areas. Range land grasshoppers also appeared in larger numbers than they have in many years. The general area of infestation lies in the western part of the state and extends east to about the Bear Paw Mountains and south to Stillwater

County. This area does not have a continuous infestation but contains most of the concentrations and pockets of heavy population in the state. Again the biggest increase in any one species is probably in *Aulocara elliotti*, which caused severe damage on ranges in Golden Valley, Stillwater, and Broadwater counties. *Camnula pellucida* caused a good deal of damage to ranges in Beaverhead County. Scattered infestations of various other species were found in some of the other western counties. *Melanoplus occidentalis* and *Melanoplus mexicanus* were present in greater than usual numbers over much of the western half of the state. The eastern part of the state experienced only very light damage and is comparatively free of grasshoppers.

Outlook for 1955

It would appear that we are either approaching or experiencing a general upward trend in grasshopper numbers. It is, of course, impossible to accurately predict grasshopper infestations, but, in the light of the current upswing in grasshopper numbers, we may be entering a period when we should expect a large increase with a resulting increase in the amount of damage on cropland and range land. The numbers of grasshoppers present could possibly reach outbreak proportions in a year or two if favorable conditions continue to persist.

OTHER IMPORTANT PESTS

MORMON CRICKETS (*Anabrus simplex*)

Mormon crickets were present in greater numbers in 1953 than in 1952. Light to moderate infestations occurred in restricted areas of Powell, Big Horn, Carbon, and Chouteau counties. Some gregarious bands were reported in Big Horn and Carbon counties and some in the upper Blackfoot River Valley. In 1954 the number of crickets present, both in gregarious bands and in scattered infestations, increased greatly. Bands were reported in at least eight different spots in the state. The biggest concentration of crickets was in the Pryor Gap area of Big Horn County. Other gregarious bands were reported from eastern Big Horn County in the vicinity of Kirby. Another large infestation occurred in the upper Blackfoot Valley in the vicinity of Ovando and Helmsville. Crickets were also reported from Blaine, Judith Basin, and Golden Valley counties. Generally, scattered crickets were encountered over a good many of the counties in the western part of the state at higher elevations. Approximately 19,000 acres were baited in 1954 to combat crickets. About 11,000 acres of this baiting was done in Big Horn County and the remaining 8,000 acres in northern Powell County. The outlook for 1955, as regards Mormon crickets, appears to indicate that we can expect an increase in numbers if favorable conditions continue to persist.

ARMY CUTWORMS (*Chorizagrotis auxiliaris*)

Army cutworms showed an average infestation in 1953. Scattered, light to moderate damage occurred in Chouteau, Sheridan, and Roosevelt counties. A very light uneconomic infestation occurred in Stillwater County. In 1954 damage occurred over a much wider area and was more severe in general. Cascade, Chouteau, Fergus, Musselshell, Golden Valley, Stillwater, and Yellowstone counties suffered spotted severe damage, especially in winter wheat. In addition, Wibaux, Fallon, Carter, Big Horn, Carbon, Gallatin, Jefferson, Madison, and Broadwater counties had moderate local infestations. Because of the inclement weather existing throughout the infestation period which occurs from February to May, toxaphene, which has been the recommended control spray, has shown erratic results. Consequently, endrin, at the rate of one ounce per acre, was used and gave excellent results.

WIREWORMS AND FALSE WIREWORMS

(Families: Elateridae & Tenebrionidae)

Wireworm damage, during the biennium, was general throughout the state, especially in the regions where wheat and root crops are grown. The general areas of infestation in 1953 were in the northeast corner of the state, in the north-central part of the state, in the southwestern part of the state, and in the northwestern part of the state. In 1954 the areas were approximately the same except that the central part of the state experienced more damage than usual. Seed treatment, with one ounce of lindane per bushel of seed, will eliminate these pests. There is, at the present time, a change-over being made in many of the seed-treating machines throughout the state which enables simultaneous treatment with a solution of aldrin for wireworm control and organic mercury for fungus control.

ARMY WORMS (*Pseudaletia unipuncta*)

For the first time since 1937 an army worm outbreak occurred in Montana. Generally, this outbreak followed the Yellowstone River Valley from Billings east to the North Dakota border. Infestation in small grains occurred in Big Horn, Rosebud, and Prairie counties. In addition, infestations in sugar beets occurred in Big Horn County and in alfalfa in Rosebud County. In Richland County the army worms were found to be attacking sweet corn. These pests were controlled quite readily with 3/10 of a pound of endrin per acre. In one case where residues were a factor, parathion was used with good results.

PALE WESTERN CUTWORMS (*Agrotis orthogonia*)

No serious infestations of pale western cutworms were reported in 1953. In 1954 moderate infestations occurred in Hill and Musselshell counties.

RED-BACKED CUTWORMS (*Euxoa ochrogaster*)

Several severe infestations occurred in western Montana in 1953. Most of these infestations were confined to gardens and truck crops. Only light infestations occurred in the same general area in 1954.

BLISTER BEETLES (Family: Meloidae)

Blister beetles are apparently becoming more important in the eastern part of the state. In 1953 blister beetles attacked potato fields and caragana hedges in Dawson County. In 1954 Nuttall's blister beetle (*Lytta nuttalli*) was present in large numbers in Dawson, Wibaux, and Richland counties in small grains, gardens, and in alfalfa.

CRESTED WHEAT PLANT BUGS (*Labops hesperius*)

Damaging populations occurred in several crested wheatgrass fields in Cascade County in 1953. There was little damage from this insect in 1954, and only one light infestation was reported from Chouteau County.

FLEA BEETLES (*Epitrix* sp. and *Systema* sp.)

Several seedling sugar beet fields in Richland County were seriously damaged in 1953 and 1954. Economic populations occurred on potatoes in Gallatin County in 1953.

WESTERN CHINCH BUGS (*Blissus*—new species near *occiduus*)

In 1953 two single, localized infestations occurred: one confined to crested wheatgrass in Big Horn County; the other involving adjacent areas of crested wheatgrass, barley, oats, and spring wheat in Beaverhead County. The damage in both cases was severe. This insect was also observed in native range, primarily on *Stipa comata* and *Agropyron smithii*, where it caused no apparent damage. It was not reported in 1954.

WHITE GRUBS (*Phyllophaga* sp.)

A single economic infestation occurred in a potato field in Cascade County in 1953. In 1954 these insects were found to be very abundant in a winter wheat field in Gallatin County; however, no apparent damage resulted.

INSECTS DESTRUCTIVE TO FIELD CROPS

SMALL GRAINS

WHEAT STREAK MOSAIC

In 1954 many of the wheat fields in north-central and eastern Montana exhibited a yellowish and unhealthy appearance early in the spring. On examination these plants proved to be infested with thrips and with a mite. The thrips later were proven to be of little consequence in producing the

unhealthy appearance of the plant. Investigation showed that the mite, *Aceria tulipae*, was carrying a virus known as wheat streak mosaic. We know that this disease has been in Montana for a number of years. However, the combination of weather conditions and the cultural practices generally followed during the summer and fall of 1953 were probably the cause of the large buildup in these mites and the resulting outbreak of wheat streak mosaic. The mites, which transmit the virus from one plant to the other, must live on and be transferred from one green plant to another. They do not live on ripened or dead plant tissue. The spring of 1953 was comparatively wet. Consequently, many farmers did not get their spring wheat planted until late in the year. This resulted in green, immature fields being present well into the fall. In addition, winter wheat was generally planted earlier than usual in the fall of 1953. Therefore, the small number of mites, which were present in the spring wheat, were able to transfer into adjacent fields of green winter wheat. The population of mites, thus uninhibited, reached tremendous numbers and resulted in the outbreak of wheat streak mosaic, which was experienced in the spring of 1954. In some cases, this damage was very severe and infested fields were total losses. In all cases where this occurred, it was found that winter wheat had been seeded early and was up before adjoining fields of spring wheat had ripened. At the present time, there is no known cure for wheat streak mosaic. Therefore, cultural practices are the best and most effective methods of control. Winter wheat should not be sown next to a field of spring wheat until the spring wheat is ripened or harvested. Likewise, the elimination of volunteer wheat plants is important so that virus-bearing mites cannot be transmitted from one crop to the next.

ENGLISH GRAIN APHID (*Macrosiphum granarium*)

Economic infestations were more widespread in 1953 than in 1954. Ravalli and Lake counties suffered considerable damage in 1953. Light infestations occurred in Daniels, Liberty, Roosevelt, Richland, Sheridan, Teton, and Toole counties. These aphids were present in light noneconomic infestations in the same general areas in 1954.

SAY'S PLANT BUG (*Chlorochroa sayi*)

Severe but localized infestations occurred in Chouteau County in winter wheat in 1953. In 1954 one local, severe infestation occurred in McCone County.

WHEAT JOINTWORM (*Harmolita tritici*)

Widely scattered light to moderate infestations occurred in Sweet Grass and Stillwater counties in 1953. Light infestations occurred in Stillwater and Fergus counties in 1954. This pest has never been a serious enemy of wheat in Montana, with infestations rarely exceeding one percent. However, due to the nature of the injury, it is rather outstanding in the field.

There is no known chemical control for this insect, but some cultural practices appear to be of value in its control.

WINTER WHEAT MITE (*Paratetranychus praetensis*)

This pest of wheat has so far been found in only one county in Montana and in only one small area. Winter wheat fields in Chouteau County during the fall of 1953 and the spring of 1954 showed some local marginal damage by this mite.

WHEAT STEM SAWFLY (*Cephus cinctus*)

Reports and limited surveys during 1953 indicated that the infested area remained about the same and that damage was neither unusually high nor unusually low. Although the season was generally late for the emerging adults in 1954, the infestation appeared to be more widespread than in the previous years.

WESTERN WHEAT APHID (*Brachycolus tritici*)

A few light infestations occurred in Broadwater County in the general regions where they had occurred in 1951 and 1952. A few very light infestations occurred in Stillwater County. In 1954 western wheat aphid was present in the triangle area in those places where winter wheat was seeded into fallow ground from which volunteer plants had not been eliminated. In general these infestations were not of economic importance.

CORN

CORN EARWORM (*Heliothis armigera*)

A few light to moderate infestations occurred in the southeastern and western part of Montana, especially in sweet corn raising areas. Generally, this pest was not as prevalent as it has been in the last two or three years.

EUROPEAN CORN BORER (*Pyrausta nubilalis*)

The European corn borer which was first reported in Montana in 1951 appears to be at about the same economic level as it was at that time. Borers are present in small numbers in irrigated corn in Prairie, Dawson, and Richland counties. No new economic infestations were observed during the past biennium.

EUROPEAN EARWIG (*Forficula auricularia*)

This insect is common on corn in all of Montana west of the Continental Divide and in southwestern Montana east of the Continental Divide. It is apparently very readily attracted to corn and has extended its area of infestation by being transported in corn ears from one locality to another.

ALFALFA AND CLOVER

ALFALFA WEEVIL (*Hypera postica*)

This pest of alfalfa is occurring over an ever-widening range in Montana. Almost all the counties in the state, except those north of Deer Lodge and Silver Bow counties in the western part of the state, have infestations of this insect. At the present time this pest has reached the northern border of Montana on approximately a 300-mile front and has penetrated about 80 miles into Canada. Since Montana has worked out an efficient method of combatting this pest, the Provincial governments of Alberta and Saskatchewan have requested assistance from this office in initiating a control program in those areas. Technical assistance, in the form of advice and in the loan of instructional aids, has been given. At the present time, the best method of control is in the use of heptachlor or dieldrin applied at the rate of $\frac{1}{4}$ pound of the active ingredient per acre.

LESSER CLOVER LEAF WEEVIL (*Hypera nigrostris*)

Several damaging infestations were reported in Lake County, and one field of ladino clover in Ravalli County was seriously damaged by this insect. Although this weevil appears to be present on almost all clover plants in the state, it apparently reaches economic proportions only in widely scattered areas.

LYGUS BUG (*Lygus* spp.)

The incidence of Lygus bugs has been rather high during the last biennium, especially during mid- and late summer. Some control measures, using toxaphene, have been necessary over widely scattered areas of the state where alfalfa seed is produced. Treatment for these insects is made after 7 o'clock in the evening or before 7 o'clock in the morning to protect the valuable pollinators—the honey bees and the alkali bees.

SWEETCLOVER WEEVIL (*Sitona cylindricollis*)

The damage by this insect was confined largely to the western part of the state. Some marginal defoliation of alfalfa occurred over widely scattered areas.

VARIEGATED CUTWORM (*Peridroma margaritosa*)

In 1953 light to moderate infestations occurred in alfalfa fields in Prairie and Rosebud counties. No economic infestations were reported during 1954.

ALFALFA SEED CHALCID (*Bruchophagus gibbus*)

Although no extremely severe infestations of this insect were known to exist during the biennium, very light and widely scattered infestations occurred over most of the alfalfa-seed-producing areas in the state. Trash removal and crop rotation on a community wide basis are the best weapons we have against this insect.

PEA APHID (*Macrosiphum pisi*)

Only light infestations of pea aphids on alfalfa occurred in 1953; however, there appeared to be quite a large buildup in 1954 in most of the alfalfa areas. In most cases, the control measures recommended for lygus bugs took care of the aphids. Where alfalfa was used for forage, this insect was virtually eliminated when the hay was cut.

POTATOES

COLORADO POTATO BEETLE (*Leptinotarsa decemlineata*)

Local infestations occurred in Dawson, Lewis and Clark, Sweet Grass, and Ravalli counties in 1953. Gallatin, Madison, and Lewis and Clark counties had higher than usual populations during 1954. This beetle is readily controlled with DDT. The general recommended practice has been to apply this insecticide in 100 gallons of water per acre. At the present time there appear to be indications that good control may be achieved with as little as 25 gallons of water per acre, provided conscientious and efficient methods of application are used.

POTATO PSYLLID (*Paratrioza cockerelli*)

Several moderate infestations occurred on potatoes in Carbon County in 1953. There was little activity and no infestation reported during 1954.

FLEA BEETLE (*Epiditrix* sp.)

These insects were present on potatoes in economic proportions in Gallatin County in 1953. They were present in Gallatin, Madison, Park, Fergus, and Lewis and Clark counties in higher than normal populations in 1954. Either toxaphene or DDT controls this insect.

SUGAR BEETS

BEET WEBWORM (*Loxostege sticticalis*)

Severe infestations occurred on sugar beets in Custer, Rosebud, Treasure, Big Horn, Yellowstone, Carbon, Broadwater, Richland, and Roosevelt counties during the biennium. Three local infestations in alfalfa were reported along the Yellowstone River in 1954. In Gallatin County in 1953 these insects invaded seed and canning peas and produced a considerable amount of damage.

BLACK CUTWORM (*Agrotis ypsilon*)

Severe damage occurred in many sugar beet fields in Big Horn County. The damage was primarily caused from subterranean girdling of plants in the crown area after which most of the damaged plants would die. There were no economic infestations reported during 1954.

SUGAR BEET ROOT MAGGOT (*Tetanops aldrichi*)

This insect has not been of too much importance, and only one infestation was reported from Carbon County.

PEAS AND BEANS

PEA APHID (*Macrosiphum pisi*)

This insect was present in moderate numbers over most of the pea-growing area of the state during the biennium. However, no severe infestations were reported.

PEA WEEVIL (*Bruchus pisorum*)

No economic infestations of pea weevil were observed or reported during the biennium.

INSECTS DESTRUCTIVE TO GARDEN AND TRUCK CROPS

CRUCIFERAE

CABBAGE MAGGOT (*Hylemya brassicae*)

This garden pest continues to be common throughout most of the state. If transplanting water containing chlordane is used in areas known to be infested, the cabbage maggot seldom becomes a serious problem.

IMPORTED CABBAGEWORM (*Pieris rapae*)

No outstanding infestations were reported in 1953. In 1954 some light to moderate infestations were observed in the western part of the state.

ROOT CROPS

ONION MAGGOT (*Hylemya antiqua*)

This pest continues to occur in gardens generally throughout the state. However, it is quite easily controlled by the use of chlordane at the time of planting.

INSECTS DESTRUCTIVE TO FRUIT CROPS

ORCHARDS

BLACK CHERRY FRUIT FLY (*Rhagoletis fausta*)

During 1954 a rather extensive trapping program involving the east shore of Flathead Lake and the surrounding area indicated that this pest was much more widespread and causes a higher incidence of infected fruit than was previously known. Spray programs using tetraethyl pyrophosphate and parathion gave excellent results in controlling this insect. However, the presence of unattended orchards and individual trees around homes which receive no control measures provides a constant source of reinfestation of the commercial orchards in the area. There is still no indication that this pest may be harbored in the native wild cherry.

PLUM NURSERY MITE (*Vasates fockeui*)

and

BIG-BEAKED PLUM MITE (*Diptacus gigantorhynchus*)

Populations of these mites were below economic importance in 1953. However, in 1954 a general outbreak occurred on the east shore of Flathead Lake and had to be brought under control by the use of miticides.

PEAR SLUG (*Caliroa cerasi*)

During 1953 one economic infestation on cherry trees was reported from Mineral County. During 1954 economic infestations occurred in Broadwater, Gallatin, Lake, and Ravalli counties.

BLACK CHERRY APHID (*Myzus cerasi*)

Although populations of this pest were normal or below during 1953, there was an increase in numbers during 1954. Delayed dormant oils applied in late spring control this pest very well.

CODLING MOTH (*Carpocapsa pomonella*)

No unusual outbreaks of this insect occurred during 1953. In 1954 one infestation in an apple orchard in Carbon County was reported. This pest is usually not dangerous where spray schedules in commercial plantings are followed closely.

PEAR LEAF BLISTER MITE (*Eriophyes pyri*)

Where orchards received preventative spray treatment this pest has not become abundant. However, it does continue to seriously infest most western Montana orchards that do not receive treatment. In 1954 it was reported from Lake, Ravalli, Missoula, and Flathead counties.

SMALL FRUITS

CURRANT FRUIT FLY (*Epochra canadensis*)

Although the currant fruit fly is widely distributed throughout the state, it was reported only from Sweet Grass County in 1953. There were no economic infestations reported or observed in 1954.

RASPBERRY CANE BORER (*Oberea bimaculata*)

Light to moderate infestations occurred generally throughout western Montana during the biennium.

RASPBERRY ROOT BORER (*Bembecia marginata*)

Severe infestations occurred throughout many areas of western Montana.

STRAWBERRY LEAF ROLLER (*Ancylis comptana fragariae*)

No economic infestations of this pest were reported or observed during the biennium.

INSECTS DESTRUCTIVE TO ORNAMENTALS

DECIDUOUS ORNAMENTALS

ASH PLANT BUG (*Neoborus amoenus*)

This pest has definitely become more abundant during the last two years. In 1953 damaging infestations were reported or observed in Gallatin and Yellowstone counties. In 1954, however, the entire southwestern part of the state had slight to moderate damage. Heavy damage to ash occurred in Gallatin, Yellowstone, and Fergus counties.

COTTONWOOD GALL MITE (*Eriophyes* sp.)

Infestations occurred in Musselshell, Yellowstone, and Chouteau counties in 1953. In 1954 infestations occurred in Yellowstone, Teton, Cascade, and Chouteau counties.

COTTONWOOD LEAF-STEM GALL (*Pemphigus populi-transversus*)

An infestation was reported in Sweet Grass County in 1953. Infestations were reported from Golden Valley, Cascade, Teton, Big Horn, Rosebud, and Yellowstone counties in 1954.

VAGABOND GALL (*Mordwilkoja vagabunda*)

This aphid on cottonwoods has been reported from the triangle area and the south-central area of Montana both years of the biennium.

A TENT CATERPILLAR (*Malacosoma* sp.)

Moderate to severe infestations occurred in Flathead, Lake, and Gallatin counties in 1953. There were no infestations observed or reported during 1954.

POPLAR BORER (*Saperda calcarata*)

Poplar borers appeared to be more prevalent during the past two years than they had been for some time. Severe infestations occurred in Big Horn and Deer Lodge counties, and moderate damage was found in scattered areas over the state.

ELM LEAF CURL APHID (*Eriosoma americanum*)

These aphids were quite abundant in 1954 although there were few reports of their occurrence in 1953. Some towns in the state had to initiate control programs to combat this pest. Organic phosphates, applied under high pressure to penetrate the curled leaves, gave good control of this insect.

SPIDER MITE (Order: Acarina)

Many light to moderate infestations of spider mites occurred on raspberries and coniferous trees over most parts of the state during the biennium. These infestations are always more severe during dry weather and especially during the midsummer months. Malathion sprays have been used in most control programs with good results.

COTTONY MAPLE SCALE (*Pulvinaria vitis*)

Only one infestation of this pest was reported during the biennium. This occurred on box elder in 1954 in Park County.

OYSTERSHELL SCALE (*Lepidosaphes ulmi*)

Oystershell scale was present during the biennium over widely scattered parts of the state, especially in unattended orchards and on backyard fruit trees. Where severe infestations developed, they were controlled very readily with dormant sprays.

VIRGINIA CREEPER LEAF HOPPER (*Erythroneura ziczac*)

The Virginia creeper leaf hopper has caused much damage throughout the state during the last year. The central part of the state, Chouteau and Cascade counties in particular, appeared to be the hardest hit. In some areas Virginia creeper had to be pulled out, as it was damaged beyond a point where it could be rejuvenated. This pest is successfully controlled with DDT sprays and dust.

ROSE CURCULIO (*Rhynchites bicolor*)

The rose curculio occurred in economic numbers in Lake, Gallatin, and Missoula counties during the biennium. Local and moderate damage occurred throughout most of the state. Since this insect may live over and reproduce on wild roses, there is little which can be done to eliminate it from areas where these wild hosts exist. However, it may be prevented from damaging garden roses by the use of a DDT spray.

SPINY ROSE GALL (*Diplolepis bicolor*)

One infestation of this insect was reported from Lake County on roses in 1954. This hymenopterous insect causes unsightly galls to form on the main stem of rose bushes.

POPLAR SAWFLY (*Trichiocampus viminalis*)

One infestation of this pest was recorded in Liberty County in 1954.

THE GRAPE LEAF HOPPER (*Erythroneura comes*)

In 1954 Beta grapes in Fort Benton were infested by this sucking insect.

CONIFERS

BLUE SPRUCE GALL APHID (*Adelges cooleyi*)

This periodic pest was present throughout most of the state during the biennium. Inquiries were received from Gallatin, Yellowstone, Silver Bow, and Musselshell counties. A new organic phosphate of low human toxicity known as malathion has been used very successfully against this insect, which causes cone-like swellings on the new terminal growth.

SPRUCE LEAF-TIER (*Epinotia nanana*)

No cases of spruce leaf-tier infestations were reported during the biennium.

PINE LEAF SCALE (*Chionaspis pinifoliae*)

Pine leaf scale was present throughout most of the state during the biennium. Probably the worst infestations occurred in Yellowstone, Fergus, Big Horn, Musselshell, and Toole counties. Although this insect is known as the pine leaf scale, its preferred host under Montana conditions appears to be Colorado blue spruce. This insect is controlled with timely applications of dormant sprays or with organic phosphates.

RED SPIDER (Order: Acarina)

These pests were present in greater than usual numbers throughout large areas of the state and did considerable damage to evergreens in the south-central part of the state.

SPRUCE NEEDLE MINER (*Taniva albolineana*)

One infestation of spruce needle miner was reported during the biennium from Lake County.

SPRUCE BUDWORM (*Choristoneura fumiferana*)

Although this insect is primarily a pest of timber trees, reports of infestations on ornamentals in towns of the southwestern part of the state have been received. Huge flights of the night-flying adults were lured into town by the electric lights.

DESTRUCTIVE HOUSEHOLD INSECTS

CLOVER MITES (*Bryobia praetiosa*)

Clover mites continued to represent a major household pest throughout most of the state during the biennium. Reports and inquiries concerning this pest were received from almost every county in the state. Since control of this pest is very difficult, a program is being planned to work out the most efficient methods of control.

CLOTHES MOTHS (Family: Tineidae)

Although clothes moths are present throughout the state, they are generally held in check by the efficient insecticides which are available for combatting them. Few inquiries were received since most housewives can get excellent results by using these readily available chemicals.

DERMESTIDS (Family: Dermestidae)

The presence of these insects in the state is surprisingly common. Inquiries have been received from practically all the larger towns. Generally, the chlorinated hydrocarbons will control these insects very well. However, where severe infestations which are hard to contact are found, cyanide fumigation may be necessary.

COCKROACHES (Family: Blattidae)

Cockroaches continue to be present throughout most of the state with the exception of the northeastern corner.

TERMITES (Order: Isoptera)

Infestation in newsprint was reported in Prairie County. An infestation on a ranch was reported in Sweet Grass County, and several houses in Mineral and Chouteau counties were reported to be infested in 1953. In 1954 houses in Dawson and Phillips counties were found to be infested. In most of these cases, commercial pest control operators exterminated the termites.

CEREAL INSECTS (Orders: Coleoptera and Lepidoptera)

Cereal insects as household pests have not been too prevalent during the biennium. However, occasional cases arise where they do infest cereals stored in cupboards and in pantries. These infestations are readily eliminated by destroying the infested cereal, cleaning up the storage area, and then spraying with either DDT or chlordane.

FLIES (Family: Muscidae)

There is nothing that will help more in a fly elimination program than good sanitation. At the present time, good sanitation in conjunction with the newer bait-type fly poisons can keep housefly populations below nuisance levels.

ANTS (Family: Formicidae)

These insects occur generally in and around households throughout the state. In some cases, breaks in foundation walls have provided ready entrance for these pests. Chlordane, either dusted or sprayed, in and around the runways of ants, appears to give excellent control.

POWDER POST BEETLES (Order: Coleoptera)

One infestation by powder post beetles was reported in Lake County in 1954. This particular infestation had apparently been active for a number of years, and extensive repairs to the infested store were necessary.

LONG HORNED BEETLES (Family: Cerambycidae)

One infestation in a log house in Cascade County was reported. Surface treatment of logs with oil solutions of DDT prevent further infestation, and the deep-boring larvae are killed by injecting insecticide into the logs.

STRAWBERRY ROOT WEEVIL (*Brachyrhinus ovatus*)

These insects migrate into houses in the fall in search of protected quarters to spend the winter. Although they are harmless, their presence elicits many requests for information about them from home owners.

INSECTS DESTRUCTIVE TO MAN AND ANIMALS

MOSQUITOES (Family: Culicidae)

The results of the mosquito investigations in northern Montana indicate that the mosquito problem in this area and similar areas is a direct result of irrigation. Over 90 percent of all mosquito production in the study area resulted from the farmers' use of irrigation water. Most of the conditions that resulted in mosquito breeding were directly related to heavy soils, insufficient land preparation, improper irrigation practices, and inadequate maintenance of irrigation and drainage facilities. It is also noteworthy that over 70 percent of the mosquito production came from fields which were being used for crops. Some of the more water-tolerant crops, such as blue joint, were the worst offenders. Since the mosquito problem is primarily related to irrigation, the need for research to determine better and more efficient methods of applying and removing water is obvious. In addition, this research would furnish valuable information regarding the rate at which water penetrates the soil, the movement of underground water, and other crops and farming techniques suitable for use wherever this problem is present. Without a doubt, the mosquito problem in the Milk River Valley has affected the entire economy of the area, for workers are reluctant to enter mosquito-infested areas if work is available elsewhere. With proper application of water, new crops and diversification in farming may be possible.

With improved irrigation practices, *Culex tarsalis*, the mosquito vector of western equine encephalitis and St. Louis virus, would be decreased in numbers to the point where the threat of these diseases would disappear. The co-operating agencies, which include the United States Public Health Service, the Montana State Board of Health, the Montana Agricultural Experiment Station, the Blaine County Mosquito Committee, and the State

Entomologist, have requested and received co-operation from the Soil Conservation Research Branch, Agricultural Research Service, to carry on the work necessary to continue this project. At the time of writing, only preliminary phases of this work are underway.

Elsewhere in Montana the mosquito problem persists as usual. Five municipalities requested information and aid in carrying on mosquito control work. Four others merely requested information but did not initiate an active control program. Because of this apparent interest a rather comprehensive publication is planned which will outline the best methods of mosquito control.

CATTLE GRUBS (*Hypoderma lineatum* and *Hypoderma bovis*)

Data gathered from within the state and from other sources indicate that chemical control of this pest leaves much to be desired. All controls have heretofore been directed at the grub in the animal's back—at a time when the damage has already been done. It was thought that by killing these grubs the populations could be reduced in future generations. In some instances, where cattle have been treated for a number of years, the current population of warbles is the same as before the treatment was started. In the light of this evidence many stockmen have discontinued treatment for this pest.

CATTLE LICE (Orders: Mallophaga and Anoplura)

Cattle lice continued to be a problem throughout the state especially during the winter months. Since treatment for lice involves a good deal of hand labor, a research program using the self-applicating type of back rubber will be carried out. During the biennium another species of louse, *Solenopotes capillatus*, was found to occur in the state. This brings the number of species to four. The other three are: *Haematopinus eurysternus*, *Linognathus vituli*, and *Bovicola bovis*.

SHEEP TICKS (*Melophagus ovinus*)

This parasitic fly occurs state-wide wherever sheep are raised. A rotenone spray is the most practical method of combatting this insect.

HORN FLIES (*Siphona irritans*)

The incidence of horn flies appeared to be about normal during the biennium. In 1953, however, the season extended longer than normal because of the warm, open fall. Aerial application of insecticide to range cattle was attempted during the summer of 1953. The animals were first bunched by plane and then sprayed with DDT. Excellent control was achieved for a month at a cost of about 40 cents per head. The back-rubber type of applicator appears to work quite well when it is in a convenient, readily accessible location and when there is little competition from brush or other objects which can be used for rubbing.

MISCELLANEOUS

THE GOATWEED BEETLE PROGRAM

At the present time it is almost impossible to predict the over-all success of the *Chrysolina* beetle in eliminating goatweed from Montana ranges. In general, the outlook is quite optimistic considering the adverse weather conditions which existed during the past two years. Even with these deterring conditions some of the colonies have shown remarkable progress. It appears that the most successful of these colonies are located in areas where conditions for the growth and reproduction of goatweed are best; generally, the sunny slopes which have a deep, rich, water-retaining, but well-drained soil. Colonies in shaded, damper situations have not, as a rule, been well established. Likewise, the goatweed in these areas does not show the vigor and vitality evident in the former areas. It is impossible to tell how many colonies have been redistributed during the last biennium. Many farmers and ranchers have collected colonies from established sites and redistributed them on their own premises. To encourage and facilitate this work, a color movie has been prepared which illustrates the proper techniques to be used in gathering, transporting, and replanting goatweed beetle colonies. In regard to the colonies which have failed to become established, a study of the fall growth of the goatweed may prove to be of some significance. Ordinarily the plants produce basal growth in the fall which serves as food for the larvae of the beetles. Under some conditions it appears that this growth either does not exist or, at best, is very limited. Some work of this type will be done in the fall of 1954. Another insect which attacks goatweed is a root borer, *Agilus hyperici*. In areas where *Chrysolina* has had limited success, this root borer has cleared out dense goatweed stands. An attempt to establish these borers is planned where this condition exists in Montana.

BIENNIAL REPORT OF THE STATE APIARIST OF MONTANA

1953 AND 1954

During the past biennium the State Apiarist has carried out the various duties as prescribed by state law. He has been greatly aided in this work by the amendments to the Montana Apiculture Law which were passed by the 1953 session of the legislature. The State Apiarist operates on the premise that regulation should be resorted to only when education fails, and it is toward this end that work has been directed. In the furtherance of this idea, many contacts have been made with small beekeepers, the so-called "hobby beekeepers." A short resume of beekeeping and what to expect from it has been written and distributed to many 4-H Club members, FFA members, and other hobbyists interested in keeping bees. The State Apiarist has aided several amateurs in becoming established in a part-time beekeeping business and has, in addition, been instrumental in finding buyers for at least four large commercial beekeeping operations.

The State Apiarist is constantly being called upon to supply information to out-of-state beekeepers who are interested in conditions relative to bee-

keeping in Montana. In addition, a new and more efficient system of keeping records on all Montana beekeepers has been set up. A quarterly publication, *The Montana Beekeepers*, is being published and goes free of charge to all registered beekeepers.

The State Apiarist is frequently called upon to act as the arbitrator between beekeepers in territory disputes. Other duties involve inspection and quarantine of all bees on comb and other possible disease-carrying equipment which is brought into the state.

In 1954 Montana had 166 registered beekeepers, 63 of whom are commercial men who make all or at least the greatest percent of their living from bees; 103 registered small beekeepers or hobbyists; plus an undetermined number of small nonregistered beekeepers. While having nonregistered beekeepers is undesirable, it has been impractical for the State Apiarist to find and register all of these small beekeepers. The State Apiarist has allowed treatment of American Foulbrood with sulfathiazol and terramycin when it could be determined that such treatment was properly carried out. This so-called leniency has allowed the beekeeping industry to expand into many heretofore unworkable locations, which were so contaminated with American Foulbrood as to make beekeeping unprofitable if not impossible. These areas were in the vicinity of rimrocks, trees, and old buildings which harbored contaminated bees, and under such situations it is impossible to eliminate them with present known methods. A more distressing problem than American Foulbrood has been relatively recent outbreaks of European Foulbrood. The State Apiarist has set up experimental work on this bee disease and is at present recommending the use of dihydrostreptomycin and terramycin as a possible cure.

Beekeeping has expanded from 30,000 colonies in 1941 to around 62,000 colonies in 1954. However, the large honey crops of the 1940's are apparently a thing of the past. However, Montana still rates far above the national average in honey production and even above the average for the western part of the United States, as is shown in the following table.

POUNDS OF HONEY PER COLONY

Year —	1948	1949	1950	1951	1952	1953
Montana	122	58	60	80	83	87
United States	36.0	40.6	41.5	46.4	49.5	40.5
Western U. S.	52.9	52.6	51.0	61.8	74.8	51.5

The most logical explanation for this decrease in honey production per colony is the overcrowding of bee territory by beekeepers and the partial elimination of volunteer sweet clover and alfalfa from Montana highways, railroad rights of way, and irrigation ditches with herbicides. Weed spraying has also tended to limit the production of sweet clover honey, which for many years has made Montana famous both nationally and internationally on the honey markets. In many cases clover is being replaced not by grass, as was the original intent, but by weeds, which are undesirable from the standpoint of honey production.

HONEY AND BEESWAX PRODUCTION IN MONTANA FOR THE YEARS 1942-1953

Year—	1942	1944	1946	1948	1949	1950	1951	1952	1953
Honey (1,000 lbs.)	4,600	4,444	3,432	7,808	3,596	3,720	5,200	5,146	5,742
Beeswax (1,000 lbs.)	150	102	69	141	61	60	94	93	98
Col. of bees	36,000	44,000	52,000	64,000	62,000	62,000	65,000	62,000	66,000
Avg. per col. (lbs.)	128	101	66	122	58	60	80	83	87

GENERAL STATEMENT ON THE PROGRESS OF DISEASE CONTROL

Montana has for the past several years maintained about the same over-all percentage of American Foulbrood. Some years one area will be heavily contaminated; it will be cleaned up, and the next year this disease will break out in another locality. The approximate over-all American Foulbrood percentage has been about 4.5 percent infection, as indicated by yearly inspection records. However, it must be kept in mind that this figure is probably high because of the fact that most inspecting has been done where the State Apiarist has anticipated the heaviest infection. This naturally would give an improperly weighted figure.

TABLE OF INCIDENCE OF AMERICAN FOULBROOD IN COLONIES
INSPECTED BY THE ASSISTANT STATE APIARIST

County	Total colonies	1953			Destroyed
		Colonies inspected	A. F. B. found		
Beaverhead	1,143	47	0		0
Big Horn	3,057	473	17		15
Blaine	2,946	360	0		0
Carter	87	16	0		0
Custer	1,386	27	0		0
Dawson	1,201	72	4		4
Fallon	8	8	0		0
Flathead	903	273	26		26
Lincoln	132	22	0		0
McCone	840	47	1		0
Petroleum	270	41	0		0
Phillips	1,032	306	7		7
Powder River	846	72	6		6
Prairie	668	14	2		2
Richland	1,785	602	54		54
Roosevelt	1,292	105	4		0
Sanders	1,026	402	8		8
Valley	1,984	183	22		22
1954 (Incomplete)					
Beaverhead	1,143	16	0		0
Big Horn	3,057	380	2		2
Carbon	235	91	0		0
Lewis & Clark	1,608	200	12		10
Missoula	533	402	19		17
Musselshell	235	11	0		0
Park	1,953	306	6		6
Ravalli	2,471	1,102	78		76
Rosebud	1,074	17	8		8
Stillwater	1,219	300	15		15
Sweet Grass	1,599	602	72		62
Yellowstone	2,287	32	0		0

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